

## Final Performance Report for NAG5-12147

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## Summary of Research

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We obtained FUSE observations of NGC 7469 on 2002 Dec 13 & 14. The two exposures totaled only 7 ks. The observations only have good data in one channel, LiF1, due to channel alignment problems. These observations were obtained simultaneously with high-quality HST/STIS and Chandra HETG spectra. The previously known O VI absorption lines in the FUSE spectrum are detected at good signal to noise ratio, and a wide array of other intrinsic absorption lines are visible in the X-ray spectrum and in the STIS spectrum. Compared to prior FUSE observations, the continuum flux for this observation was 50% lower. We see the effects of this in the lowest-velocity O VI absorber, which we associate with the X-ray absorbing gas also detected in this object. This O VI absorber has only a 50% covering fraction, consistent with its covering only the continuum in this source, and its strength and inferred column density increased as the continuum flux of NGC 7469 decreased. This is consistent with the recombination expected from photoionization models of the highly ionized gas.

We obtained FUSE observations of Mrk 279 on 2002 May 18. As for NGC 7469, channel alignment problems led to good data being present only in LiF1. While we obtained a much longer integration on the target than planned (47.4 ks vs. 31 ks requested), the UV flux was down a factor of 10 or more from previous HST and FUSE observations, and our wavelength coverage was restricted due to the channel alignment problems. These data still cover the important O VI emission line and absorption lines in Mrk 279. The FUSE flux also agrees well with the simultaneous HST STIS data, which have good signal to noise. We have also analyzed FUSE observations made at three earlier epochs. We detect the Fe K-alpha emission line in the Chandra spectrum, and its flux is consistent with the low X-ray continuum flux level of Mrk 279 at the time of the observation. Because of low signal-to-noise ratios (S/N) in the Chandra spectrum, no O VII or O VIII absorption features are observable in the Chandra data, but the UV spectra reveal strong and complex absorption from H I and high-ionization species such as O VI, N V, and C IV, as well as from low-ionization species such as C III, N III, C II, and N II in some velocity components. The far-UV spectral coverage of the FUSE data provides information on high-order Lyman series absorption, which we use to calculate the optical depths and line and continuum covering fractions in the intrinsic H I absorbing gas in a self-consistent fashion. Based on the velocities, profile shapes, covering fractions and variability of the UV absorption, we conclude that some of the absorption components, particularly those showing prominent low-ionization lines, are likely associated with the host galaxy of Mrk 279, and possibly with its interaction with a close companion galaxy, while the remainder arises in a nuclear outflow.

**Bibliography of Publications Resulting from this Work**

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